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From: MOORE Fredrick
To: Cole, Connie
Subject: Can You Check the Science
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Attachments: 20120425151621934.pdf

Hi Connie, can you check with somebody to see if the attached biotreatment wording that was used in the CERCLA leachate treatment is applicable to the use of the vacuum at the RCRA landfill? If yes, I would pass this on to Christy.

Cheers, Fredrick

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DRAFT BIOTREATMENT WORK
PLAN

CERCLA Landfill, The Dalles, Oregon

P R E P A R E D F O R

Oregon Department of Environmental
Quality

Columbia River outfall with secondary batch treatment (nutrient addition) in the 300,000-gallon LCS tank, if needed.

BIOTREATMENT PROCESS

The biotreatment process will be utilized as the primary treatment technology at the site by supplying nutrients that enhance natural bacterial decay processes for cyanide. The process will effectively reduce the cyanide in the leachate before it enters the LCS and provide additional treatment in the LCS and leachate influent tank. Bacteria are ubiquitous in the natural environment and bacterial action is a prominent process in the decay of organics, and to a lesser degree inorganics. Some compounds, such as benzene, degrade more rapidly in an aerobic environment. Other compounds, such as chlorinated solvents and cyanide, degrade more rapidly in slightly anaerobic environments.

Natural anaerobic bacteria are present in The Dalles environment; however, these bacteria are not highly active because there is little available substrate (food source). Bacterial activity can be increased at the site by applying a carbon food source to the environment. The bacteria use the natural anions such as sulfates and nitrates as electron acceptors, thereby promoting some reduction in oxygen. As the system moves into a more anaerobic regime, the anaerobic bacteria co-metabolize the contaminant of concern, in this case cyanide.

Ketone formation is not a concern because the waste is inorganic and is not comprised of the types of electron acceptors that would be precursors to ketones. The formation of ketones is more likely in a municipal waste landfill, which typically have higher organic acids that could be reductively transformed to ketones or aldehydes.

The gas composition expected from aerobic and then anaerobic respiration with oxygen, nitrate, cyanide and sulfate is primarily carbon dioxide, with minor amounts of nitrogen. All of the sugars will be surface applied and most of the gases will be from surficial oxidation; therefore carbon dioxide would be the predominant gas formed. Because a pathway exists from the surface to the LCS, even if minor carbon dioxide is generated it will be in equilibrium with the LCS and will be vented through the LCS.

This biotreatment process has been used for cyanide treatment at many other sites. Per DEQ's request, ARCADIS has compiled a summary of similar sites that have applied this technology (Appendix A).

FLOW PATH EVALUATION

An evaluation of the flow regime for the CERCLA landfill area indicates that the leachate collection system (LCS) intercepts infiltrated precipitation, through a perched system in the upper, weathered portion of the basalt. The source of the perched water appears to be rainfall infiltration that occurs just west and southwest of the landfill. This infiltration results in higher LCS flows in the wet months.